

# The effect of diet on the milk quality of organic dairy cows

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## ABSTRACT

Changes in milk quality were evaluated with spring-calving dairy cows and heifers fed organic diets and different levels of concentrates during early lactation. The diets were based on *ad libitum* forage and either 2 kg of concentrates/day (Diet 1) or concentrates fed according to milk yield up to a maximum of 7 kg/day (Diet 2). Average milk yields during the study for the cows and heifers were 23.1 and 20.1 kg/day (Diet 1) and 25.8 and 24.0 kg/day (Diet 2), respectively. The highest number of samples with a fat to protein ratio of 1.4 or > were found in samples collected from cows and heifers fed Diet 1 (20.9 and 50.0%). The lowest milk protein value of 2.86% was recorded from the heifers fed Diet 1. Low milk lactose values were correlated to high somatic cell counts.

*Keywords: organic dairy; milk protein; lactose; high-forage diets*

## INTRODUCTION

Organic dairy cows are fed high-forage diets with a lower energy density than the level found in the diets fed to conventional herds. Therefore, during the early lactation period energy shortage may occur, leading to changes in milk quality and also an increased loss of body condition. Maintaining good milk quality is essential and any decline will affect the marketing and processing potential of the milk produced on the organic dairy farm.

The objective of the current study was to evaluate the effect of organic diets on milk yield and quality. Two groups of spring-calving Holstein-Friesian dairy cows and heifers were fed diets based on *ad libitum* forage and either 2 kg of concentrates/day (Diet 1) or concentrates fed according to milk yield up to a maximum of 7 kg/day (Diet 2). Grass/clover silage was the forage offered from calving until turn-out when the cows grazed perennial ryegrass/white clover swards. Milk samples were collected at 14-day intervals from calving until 156 days post-calving and analysed to determine the milk quality components.

## RESULTS

Feeding a lower level of concentrate during early lactation (Diet 1) reduced the average milk yield and also increased the loss of body condition during early lactation. A high milk fat to protein ratio indicates a negative energy balance (Heur *et al*, 2000) and potential sub-clinical health problems. In the current study a larger proportion of milk samples with a fat to protein ratio of 1.4 or > were recorded from cows and heifers fed Diet 1.

Table 1. Results recorded during the study

		Diet 1		Diet 2	
		Cows	Heifers	Cows	Heifers
Number of animals per group		6	6	8	8
Average concentrate input (kg /cow/day)		2	2	6.0	5.5
<u>Averages</u>	Mean milk yield (kg/day)	23.1	20.1	25.8	24.0
	Milk quality (%): Fat	3.85	3.93	3.73	3.49
	Protein	3.18	2.86	3.09	2.99
	Lactose	4.51	4.67	4.68	4.63
	Fat:Protein ratio	1.25	1.38	1.21	1.17
% of milk samples with:					
	Fat:Protein values of 1.4 or >	20.9	50.0	11.5	17.2
	Milk lactose values of 4.5% or <	41.9	9.1	8.1	22.4
Change in body condition score		-0.05	-0.33	+0.14	-0.13

Previous analyses on the milk from conventional herds have shown that lactose is an important milk quality component that influences the processing quality of milk and is also correlated to either low energy diets or high somatic cell counts. In the current study a high proportion of the milk samples with lactose values of 4.5% or < were correlated with high somatic cell counts (35.6%), with 13.6% correlated to a high milk fat to protein ratio. Feeding high-forage diets reduced feed costs and increased the production of milk from forage. However, the results show that the low energy density of Diet 1 led to an increase in the proportion of milk samples with a high fat to protein ratio and an increased risk of sub-clinical ketosis. With the exception of cows fed Diet 2 the average body condition score declined during the study. In all the feeding groups changing from silage to grazed herbage increased milk protein and reduced the milk fat to protein ratio, attributable to the higher energy value of the grazed herbage in the perennial ryegrass/white clover swards. High quality forage is required during the early-lactation period to avoid milk quality and the level of milk production being adversely affected. Poor quality forage and low energy diets will also influence the incidence of metabolic disorders and reproductive performance.

## ACKNOWLEDGEMENTS

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## REFERENCES

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